



Image Processing

The image above is a mosaic composed of 12 scenes acquired by a Landsat Earth survey satellite. It covers the southern third of California and parts of Arizona, Nevada, Utah and Mexico; an analyst can readily identify such features as the Grand Canyon, Lake Mead and the San Andreas Fault. This image underlines one of the major advantages of Landsat technology in Earth resources management: the ability to show analysts surface features over a very large area. It is also an example of how appropriate computer processing can supply highly informative detail of Earth's surface, including objects not visible to the human eye or to conventional cameras; each of the image's computer-assigned colors represents a different feature, such as urban land, water, vegetation, rock or desert.

Images like this are prepared from data acquired by the multispectral scanner aboard Landsat, which views Earth in four ranges of the electromagnetic spectrum, two visible bands and two in infrared. The scanner picks up radiations from ground objects and converts the radiation signatures to digital signals, which are relayed to Earth and recorded on tape. A typical satellite image contains about 10 million "pixels" or picture elements.

each covering a ground area 1.5 meters square; computerized equipment processes the tapes and plots each pixel, line by line, to produce the basic image. The image can be further processed to correct sensor errors, to heighten contrast for feature emphasis, or to enhance the end product in other ways. The key factor in conversion of digital data to visual form is the precision of the processing equipment.

The mosaic shown contains roughly 165 million pixels in three bands of the spectrum. It was prepared from tapes by Jet Propulsion Laboratory, then plotted and enhanced by Optronics International, Inc., Chelmsford, Massachusetts by means of the company's C-4300 Colorwrite, a high precision, high speed system which manipulates and analyzes digital data and presents it in visual form on film.

A large area image like the one shown offers a new perspective for resource study and also serves as a

frame of reference for more detailed studies of smaller selected areas to identify such factors as water depth or geological patterns. Enhanced imagery is useful to geologists, hydrologists, land use planners, agricultural specialists and geographers, to mention only a few, but each has a different level of interest in relief, boundary definition, color contrast and the spectral range of the imagery. To meet all users' needs, Optronics manufactures a complete family of processing systems, two of which are pictured. In center page is the C-4500 Colormation, an advanced scanner/plotter/film recorder; at lower left is the Model L-5500 Laserwriter, a high resolution image recorder; at right below are samples of the L-5500's work, four bands of a typical Landsat image recorded at different degrees of detail clarity. The world leader in manufacture of digital image processing hardware for the remote sensing community, Optronics has supplied systems for some 500 users in 40 countries.

